couplets, the summation of which, individually, is evenly divisible by 4. Fifty couplets are required for a square of this order, and fifty-one can be found summing 840, but for the above reasons they are inadmissible. Fifty other couplets can, however, be found which individually sum 990, which is not evenly divisible by 4 and can therefore be used. An associated magic square made therefrom is shown in Fig. 10.

The writer believes that all of the associated magic squares mentioned in this article show the lowest possible summation.

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WYOMING, N. J.

CURRENT PERIODICALS.

In the *Revue de Métaphysique et de Morale* for March, 1914, L. Dugas gives the text and variants of, together with a commentary on, the fragment *La Feuille de charmille* of the philosopher and poet Jules Léquyer, of whom one of his friends, Le Gal La Salle, said: "He has left pages worthy of the greatest thinkers; he has not taken rank among them." An American mathematician, A. R. Schweitzer, studies the guiding ideas of genetic logic of mathematics. Viewing mathematics as a science of discovery, the author attempts a general description of its logical position, the establishment of parallels between certain mathematicians and certain philosophers—such as Grassmann and Herbart and Schleiermacher—and the examination of examples of mathematical "activity." To compare, as the author does, the definition of mathematics given by Bertrand Russell in his *Principles of Mathematics,* which is a description of the logical nature of mathematics itself, with the definition, given by C. S. Peirce, of mathematics as the discovery of certain relations, seems to overlook the clear distinction that has existed since Kant between logic and the theory of knowledge on the one hand, and psychology on the other. Take an analogy: it is the concern of chemistry to analyze a given chemical compound; not to decide how it was brought into the laboratory. Examples of the guiding ideas of mathematics are then illustrated and discussed. (1) The principle of comparison is, in the words of E. H. Moore, that "the existence of analogies between central features of various theories implies the existence of a general theory which underlies the particular theories and unifies them with respect to those central features." (2) The principle of continuation is

that the existence of a class of particular elements (or *operanda*) which are subject to certain particular operations implies the existence of a class of general elements subject to general operations. (3) Mach's principle of economy requires that every scientific end be attained with the minimum expenditure of thought. (4) The principle of special situation is a particularization of the principle of continuation. The guiding ideas of mathematics are the same as those of non-mathematical disciplines, but mathematical ideas have a distinctive character, owing to the fact that they are perceptive in their nature; and there is, in essentials, only one guiding idea in mathematics: the principle of comparison. It is pleasant to see the growing tendency towards a union of science and philosophy: in this article we meet with citations from *Mind* and *The Monist* by the side of citations from *The Quarterly Journal of Mathematics* and *The Bulletin of the American Mathematical Society.* Xavier Léon continues and concludes his article on the socialism of Fichte according to *Der geschlossene Handelsstaat.* Edmond Laskine has a critical study on the transformations of law in the nineteenth century. G. Lechalas has a note on the remarkable infidelity with which painters often reproduce the rainbow. S. Ginzberg and Louis Couturat continue a discussion on particular propositions. Georges Guy-Grand writes on foreign politics and democracy. The usual supplement contains notices of events in the philosophical world, new books, periodicals and theses.

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The first number (January, 1914) of Vol. XV of *Scientia* (*Rivista di Scienza*) is a particularly interesting one. Beginning with this number, *Scientia* is printed on better quality and lighter paper, the edges are cut, and the number of pages remains the same. The first article is by H. H. Turner and is on "The Periodicities of Sun-Spots (A reply to Mr. E. W. Maunder)." In *Scientia* for January, 1913, Maunder had stated his view that "the sun-spot period is essentially one: there are no sub-periods: there are no multiple periods..."; and here the author criticizes Maunder's use of the term "periodicity." M. Abraham writes most clearly and instructively on the new mechanics. The principles of the old mechanics of Galileo and Newton—in particular the second and third laws of Newton—allow us to describe the motions of masses under the influence of their mutual gravitation, but do not suffice when the forces of electricity and magnetism, of light and

of heat come into play; and the *Principles of Mechanics* of Heinrich Hertz closes the phase of evolution which wished to bring the whole of physics under the old mechanics. Yet certain principles of mechanics (Lagrange's equations and the principle of least action—presumably this means Hamilton's principle) keep their value in the new mechanics when we generalize the expression of Lagrange's function and of "action." The question as to how it is that optical experiments with light from terrestrial sources do not show any influence arising from the earth's motion (Michelson) was examined by Lorentz (1892-1904) and resulted in the notion of "local time" and "the hypothesis of contraction," the latter being independently due to Fitzgerald. To be distinguished from this theory of Lorentz's is the theory of relativity set up by Einstein in 1905, which decided that the traditional ideas of geometry and kinematics have no signification. This theory is founded on two postulates: (1) the equivalence of systems having a uniform motion of translation with respect to one another; (2) the propagation of light in space is effected with the same velocity in all directions. This theory, which was developed mathematically by Minkowski in 1908, was, for the most part, regarded with scepticism by physicists whose philosophy was formed under the influence of Mach and Kirchhoff. There is a very illuminating comparison of the theory of relativity with the theory of Lorentz. The crisis of the theory of relativity began when this theory undertook to make gravity enter into the domain of its considerations, and both in Einstein's theory of 1905 and in that of 1913 gravity is an unsurmountable obstacle. Still, the theory has an honorable place in the history of the criticism of the conceptions of space and time; it has assured for itself, at any rate, an "honorable burial." But, whatever the fate of the theory of relativity, the new mechanics will continue to develop. Its object is to keep mechanics in touch with the other disciplines of physics. Augusto Righi gives a short account of recent results and conclusions as to the nature of the X-rays. They seem most probably to be of the same nature as the rays of light, and thus to be a manifestation of electromagnetic waves in the ether. Marcus Hartog writes on "Samuel Butler and recent mnemic biological theories." The main thesis of Butler's *Life and Habit* (1877) had been anticipated by Hering in 1870 (*Memory, etc.*, Eng. Trans., 4th ed., Open Court Publishing Co., Chicago and London, 1913), and Butler, when he got to know this, wrote *Unconscious Memory* (1880, 1910). The development of

Butler's views in these works, in *Luck or Cunning,* and in the *Notebooks,* is traced, and the facts are thus summed up: "Butler popularized the teaching of Hering before its existence was known to him, anticipated Semon in his detailed comparison of memory with heredity, and from a small suggestion of Hering's, planned out a physical explanation of memory in terms of vibrations, which was destined after his death to be more fully elaborated by Rignano (*The Inheritance of Acquired Characters,* Eng. Trans., Open Court Publishing Co., Chicago and London, 1911)." It may be remembered that there was an article on Butler in *The Open Court* for August, 1913. The first part of an article by Philippe Sagnac deals with the origins of the French revolution. It was slowly born from the social and political regimen which Richelieu and Louis XIV established and Louis XV and Louis XVI maintained and aggravated. The prestige of royalty, of the church, and of the nobility had decreased, philosophy had helped to form public spirit, and the science of the time had helped to destroy the credit of the sacred books. A brilliant edifice, centuries old, was undermined, and there was the irresistible force of almost the whole of a suffering nation which was conscious of its rights. Charles Guignebert examines how the life of faith and the progress of theology strengthened and complicated the two primitive triads, eastern and western, in the dogma of the Trinity, and then how the inevitable conflict between the two conceptions came to pass. R. Maunier has a critical note on Egyptian art. There are general reviews by M. Gortani and G. Bourgin on the recent progress of geodynamics and the evolution of towns, respectively. Finally, there is the usual collection of reviews and notes and supplement.

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The first article in *Scientia* for March, 1914, is by T. J. J. See on "The law of nature in celestial evolution." We have found, says the author, the fundamental law of sidereal evolution by first studying the most complex systems (the star-clusters), and, after making out the true secret of their formation, have generalized the law deduced from this study by the examination of sidereal systems of lower order. False premises misled Laplace, Sir John Herschel, Lord Kelvin, Newcomb, Sir George Darwin, and Poincaré; while the true path had been opened by Sir William Herschel, the first modern astronomer to give serious thought to the origin of clusters, in a series of papers published in the *Philosophical Transactions* from 1784 to 1818, and now accessible in Herschel's

Collected Works (London, 1912). The neglect of Herschel's conceptions of cosmogony was due to the greater accessibility of Laplace's writings. The modern "capture theory" of stars under the clustering power of universal gravitation (See), and consequent development of sidereal systems is essentially an extension of the views of Herschel. The process of capture also leads to the arrangement of the internal structure of a nebula in concentric shells of uniform brightness. The light of the nebulas is due chiefly to luminescence at low temperature, as by electric discharges in high vacua. There are many quotations from the papers of W. Herschel, and the other chief authorities in cosmogony are also briefly cited. The Herschel-See theory applies equally to sidereal systems of all types. "This quality of universality assures us the fundamental law of sidereal evolution, and alone makes possible the development of cosmogony as a new science of the stars, applicable, with unbroken continuity, to the entire sidereal universe." Camillo Acqua points out that, quite lately, phenomena of reaction in plants have been discovered, which are very perceptible and almost general for many agents of the outer world: a mechanism for receiving excitations, a transport of the excitation along plasmatic filaments of communication, which may represent physiologically—although they are not differentiated from the morphological point of view—the nervous fibers of animals. The reply to the question as to whether psychological phenomena exist in the case of plants "depends on the extension which may be given the psychological conception. The problem is proposed equally for plants and for lower animals which are situated at the end of the zoological scale. The hypothesis that even in these animals we must meet a psychological principle appears to be probable; but a decisive answer is not, and perhaps never will be, possible, since we would by such an answer penetrate into a part of that unknowable where the experimental method loses its efficacy and where the human mind had to confess its impotence." Emile Durkheim writes on the dualism of human nature and its social conditions; and maintains that it is only by historical analysis that we can give an account of how man was formed. The author's work on *Formes élémentaires de la vie réligieuse* (Paris, 1912) illustrates this general truth by an example. When seeking to study sociologically religious phenomena, the author was led to attempt to explain the particularities of our nature. The principle on which this explanation rests was not perceived by critics, and the present article is an exposition of it. S. Langdon

writes on "Babylonian magic," giving an abstract analysis of the principles and categories of Sumero-Babylonian magic; the article concludes with a few typical examples of both negative and positive magic chosen exclusively from the late period. Werner Sombart, in a study of love, luxury, and capitalism, does not propose to analyze the relations which exist between wealth, liberty of the amorous life, desire of certain groups of the population to be esteemed by others, and life in the large towns, on the one hand, and the appearance of luxury, on the other. Setting out from the fact that since the beginning of the middle ages a great luxury ruled, and attained great proportions towards the end of the eighteenth century, the author tries to find its explanation. The late F. W. Henkel gives a general review on the question of nebulas, and Arthur Kronfeld gives one on the new problems of psychiatry in Germany. Besides reviews of books and periodicals, etc., there is the usual supplement containing French translations of the English, German, and Italian articles. Φ